

Thunder-storms by districts, May, 1886.

District.	State.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	Total.		
I.	Connecticut					3															3		3								6	5	20		
	Maine					1							1	1							6		2		1	1		1			7		21		
	Massachusetts		1		1	5			1												16		2		2						8	8	43		
	New Hampshire					1							1								2		2			1					5		12		
	New York				9	3					2	1		6	1	6					4		8								2		42		
	Rhode Island					2															1	1	1									4	10		
	Vermont																				1	3		3		1					2	1	11		
	Total		1		10	15			1		3	1	2	7	1	7				1	35	1	21	1	3		1			30	18	159			
II.	Delaware																																		
	Maryland			1		3	9	6			10	7	2	5	4	8					1		10	5	3	2		5				3	4	84	
	New Jersey				1	4	5	1			3	2	2							1		5	1	4	5		7				4	7	61		
	North Carolina								1											3		2	3	7	10	1	1	3	5			2	70		
	Pennsylvania									1	5	3	5	1		2	1				7	1	14	7	4			6				2	70		
	Virginia				2	5			11	11	1	1	5	3	1	11	12		1	1	1	4		6	10	7	4		10			5	11	139	
	West Virginia					1					2	2	3	3			1					1	3		1	1						1		20	
	Total			1	3	13	27	28	3	2	21	23	23	22	15	27	1	2	5	4	18	5	47	33	30	8	1	31	5		11	28	437		
III.	Illinois	2		6	5	5	9	1	6	22	11	10	9	5	11	2					1		4	8	1	1		3		6	2		130		
	Indiana	2	1		6	1	5		1	9	16	10	23	7	13	2					1		4	17	4			3		1	4		130		
	Kentucky							1						1							2		1	2									22		
	Ohio	2	1	1	27	21	13	3	2	10	53	54	127	45	83	26				3		3	2	4	11	150	143	9	19	68	7	2	37	6	1,032
	Tennessee	1				3	7				1				3	4					4	5	6	1	1	8		3	4	5	8			66	
	Total	7	2	7	38	31	38	7	9	41	83	77	159	58	111	34		3		8	10	10	121	178	158	10	19	79	11	14	51	6	1,380		
IV.	Michigan	3								4		1	11	3	7	1							3	2				15	3		1			59	
	Minnesota			1					1	2	1	2	2	1										4	2							1		14	
	Wisconsin	1			1	1			2	2	1		2	5	1	2					2	2		3	1									27	
	Total	4		1	1	1	2		3	8	2	3	15	9	8	3	1	2	2				6	3	6			15	3		1	1		100	
V.	Dakota			1			1	2	4	2		5	4	2		3		1			3	3	1		1	2	1	1	3	1	4	5	50		
	Iowa			5	1	2	3	2	11	18	2	1	25	30	13	1		1	25	2	2	15	44	15	1	33	10	1	17	21	11	3	315		
	Nebraska	1	1	6	2	4	5	2	2	4	1	3	4		3		1						4	3		1	1	1	1	8	8	2	68		
	Total	1	1	12	3	6	9	6	17	24	3	9	33	32	16	1	4	2	25	2	5	18	49	18	2	36	12	3	21	30	23	10	433		
VI.	Arkansas					1	1			2					3						1			2				1	1	2	1	1		16	
	Indian Territory																																		
	Kansas	1	7	9	11	3	11	1	4	1		17	1	11	12		14						4	8	2	1		2	5	6	12	1	144		
	Missouri				2	5	6	1	2	4	1	7		1	8		1	1						8				2	5	6	4		65		
	Total	1	7	10	13	9	18	2	6	7	1	24	1	12	23		15	1			1		4	18	2	1		5	6	13	19	6	225		
	Grand total	13	11	31	68	75	94	43	39	82	113	137	233	140	174	72	21	10	32	15	69	40	245	254	195	55	48	141	43	58	135	68	2,734		

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories during the month, as follows:

Alabama.—6th, 16th, 28th.
 Arizona.—5th, 11th, 12th, 21st, 24th, 29th.
 British Columbia.—19th.
 California.—1st, 2d, 5th, 6th, 10th, 11th, 12th, 21st, 22d, 23d, 25th to 29th.
 Colorado.—5th, 15th, 18th.
 Connecticut.—1st, 6th, 7th, 9th, 18th, 23d.
 Dakota.—1st, 16th, 19th, 22d.
 District of Columbia.—10th, 12th, 20th.
 Florida.—4th, 7th, 15th, 17th, 18th, 23d to 26th, 28th.
 Georgia.—17th.
 Idaho.—3d, 5th, 10th, 14th, 28th.
 Illinois.—2d, 6th, 8th, 11th, 13th, 14th, 16th, 17th, 21st, 23d, 30th.
 Indiana.—3d, 4th, 8th, 17th, 24th, 25th, 26th, 30th.
 Iowa.—2d, 4th, 10th, 11th, 16th, 17th, 25th, 27th, 29th, 30th, 31st.
 Kansas.—3d, 12th, 13th, 16th, 31st.
 Kentucky.—17th.
 Maine.—7th, 10th, 24th.
 Massachusetts.—1st, 6th, 7th, 10th, 13th, 14th to 15th, 18th, 19th, 20th, 27th, 30th.
 Michigan.—7th, 8th, 13th, 23d, 29th.
 Minnesota.—20th.
 Missouri.—17th.
 Montana.—4th, 8th, 22d.
 Nebraska.—20th, 22d.
 Nevada.—2d, 21st, 25th, 29th.
 New Hampshire.—10th.
 New Jersey.—1st, 9th, 14th, 18th, 29th, 31st.
 New Mexico.—15th.

New York.—1st, 3d, 4th, 7th, 8th, 9th, 14th, 17th, 18th, 21st, 29th.

North Carolina.—19th.

Ohio.—3d, 5th, 7th, 8th, 11th, 12th, 14th, 17th, 18th, 22d, 24th, 31st.

Oregon.—1st, 2d, 3d, 15th, 16th, 22d, 25th.

Pennsylvania.—2d, 7th, 14th, 17th, 18th, 23d, 24th.

Rhode Island.—7th, 18th, 27th.

South Carolina.—4th.

Tennessee.—3d, 5th, 12th, 13th, 14th, 17th, 18th, 29th.

Texas.—12th, 17th.

Vermont.—7th, 24th.

Virginia.—5th, 6th, 11th to 14th, 17th, 18th, 24th, 30th.

Washington Territory.—2d, 6th, 15th, 18th, 19th, 25th, 30th.

Wisconsin.—4th, 11th, 12th, 16th, 17th.

Wyoming.—3d, 7th, 10th, 12th, 13th, 15th, 24th, 28th.

LUNAR HALOS.

Lunar halos were observed in the various states and territories, as follows:

Alabama.—16th, 17th.
 Arizona.—9th, 10th, 12th.
 Arkansas.—12th, 13th.
 California.—11th, 13th, 14th, 18th, 21st, 22d.
 Colorado.—12th.
 Dakota.—11th, 16th.
 District of Columbia.—7th, 17th, 18th.
 Florida.—14th, 15th.
 Atlanta.—14th.
 Illinois.—10th, 12th, 13th, 17th, 19th, 27th.
 Indiana.—8th, 9th, 13th, 16th, 17th, 18th.
 Iowa.—10th, 12th, 13th, 14th, 16th.
 Kansas.—10th to 13th.
 Kentucky.—10th, 13th, 17th.
 Louisiana.—15th, 16th.
 Maine.—7th, 10th, 13th, 18th, 26th.

Massachusetts.—13th, 16th.
 Michigan.—9th, 13th, 14th, 15th, 21st.
 Minnesota.—11th, 12th.
 Missouri.—12th.
 Montana.—14th, 16th.
 Nebraska.—10th, 12th, 13th, 14th, 17th.
 New Hampshire.—13th.
 New Jersey.—10th, 13th.
 New York.—7th, 9th, 11th, 13th, 18th.
 Ohio.—8th, 9th, 13th, 17th.
 Oregon.—12th, 15th, 17th.
 Pennsylvania.—13th, 17th.
 Rhode Island.—9th, 10th, 14th, 18th.
 Tennessee.—8th to 11th, 14th, 16th, 17th, 30th.
 Texas.—10th, 11th, 12th, 15th, 16th.
 Vermont.—3d, 17th, 18th.
 Virginia.—11th, 12th, 13th, 17th.
 Washington Territory.—16th.
 West Virginia.—8th.
 Wisconsin.—12th, 13th, 14th, 16th, 23d.

The phases of the moon during May, as given in "The American Ephemeris and Nautical Almanac" for 1886, are as follows: new moon, 3d, 10 h. 34.3 m.; first quarter, 10th, 9 h. 12.4 m.; full moon, 17th, 8 h. 38.9 m.; last quarter, 25th, 6 h. 27.9 m.; apogee, 24th, 6.2 h.; perigee, 5th, 5.7 h. (Washington mean time).

MIRAGE.

Oswego, New York: on the afternoon of the 9th, Stony and Duck Islands, which ordinarily are invisible from Oswego, were plainly seen and at times appeared inverted, when the tops of trees seemed to touch. The same phenomenon was also observed on the 14th.

Traverse City, Michigan, 16th.
 Reidsville, North Carolina, 25th.
 Parkersburg, West Virginia, 10th, 11th, 12th.
 Duluth, Minnesota, 2d, 3d.
 Indianola, Texas, 22d to 26th.
 Webster, Dakota, 1st, 2d, 5th to 8th, 10th, 11th, 12th, 14th, 15th, 16th, 18th, 21st to 25th.

MISCELLANEOUS PHENOMENA.

SUN SPOTS.

Prof. David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for May, 1886:

Date— May, 1886. Standard time.	No. of new.		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
2, 11 a. m.	1	30†	0	0	1	30†	5	95†	
3, 4 p. m.	0	15†	0	0	0	0	3	110†	
4, 9 a. m.	0	0	0	0	0	0	3	100†	
6, 6 p. m.	0	0	0	0	0	0	4	100†	
9, 10 a. m.	0	40†	0	0	0	0	2	130†	
12, 6 p. m.	3	10†	0	0	0	0	4	25†	
14, 12 m.	0	0	0	0	0	0	1	8	
16, 1 p. m.	0	0	0	0	0	0	0	0	
17, 8 a. m.	0	0	0	0	0	0	0	0	
19, 9 a. m.	1	3	0	0	0	0	1	3	
20, 3 p. m.	0	0	0	0	0	0	1	3	
23, 9 a. m.	1	6	0	0	0	0	2	9	
28, 6 p. m.	2	3	0	0	0	0	4	8	
30, 10 a. m.	1	30†	0	0	0	0	4	40†	

Facule were seen at the time of every observation. †Approximated.

Mr. H. D. Govey, of North Lewisburg, Champaign county, Ohio, reports having observed sun spots on the following dates: 2d, 3d, 4th, 6th, 7th, 8th, 11th to 14th, 19th, 20th, 21st, 25th to 31st.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and fifty-six stations show 4,835 observations to have been made, of which four were reported doubtful; of the re-

mainder, 4,831, there were 4,257, or 88.1 per cent., followed by the expected weather.

DROUGHT.

Abilene, Texas: a drought of great severity has extended over this part of Texas during the present spring. Cattle have died in some places in large numbers from the want of water. The prairies look brown, the grass being dried by the heat. Farmers report that crops of all kinds are a failure.

Midland, Midland county, Texas: from November, 1885, until May 31, 1886, the total precipitation was only 1.33 inches. The result is bad both for stockmen and farmers; many sheep have died from want of water; seventy-five per cent. of the lambs have perished.

Indianola, Texas, 31st: at the close of the month streams were drying up and fish dying; stock were driven nine and ten miles for water and were perishing in large numbers from lack of water and food.

Palestine, Texas, May 31st: the continued hot and dry weather of May has injured, and in places entirely killed the crops of Anderson county. Very little rain fell during the month.

The following is taken from the New York "Daily News" of May 27th:

FORT WORTH, TEXAS, May 27.—The unprecedented drought throughout north and west Texas continues. Reports received from forty-eight counties in the dry section show the crops to be almost entirely a failure. In many counties there will hardly be corn enough raised to replace the seed, while in others the wheat and oat crops are entire failures. The oldest settlers say this is the longest drought for this season known in the history of Texas. In most counties there is no grass at all, and stock water is getting very scarce. The range is not as good now as it was in January and February last. In regard to the mortality of cattle on the trails and the great ranches of the West, little that is authentic can be obtained. Reports agree, however, that the plains are covered with dead carcasses, and that hundreds of animals are dying daily of starvation and thirst. Many herds are too weak to be driven to water.

Fort Sill, Indian Territory, 31st: post gardens destroyed by drought and cattle grazing seriously injured.

Wellington, Sumner county, Kansas: it is estimated that the drought which prevailed in this vicinity during May will reduce the wheat and oat crops 25 per cent. below the average.

Elk Falls, Elk county, Kansas: only 0.40 inch rain fell at this place during the month. Crops in this part of the state were suffering from drought at the close of the month.

Shreveport, Louisiana: at the close of the month this town and the surrounding country was suffering from lack of rain. The soil was so hardened by heat and want of moisture as to render ploughing very difficult. The total rainfall for May was only 0.08 inch. The Red River was several feet lower than it has been in any May since establishment of the Signal Office at Shreveport.

Liberty Hill, Bienville parish, Louisiana, 31st: very little rain has fallen during the past six weeks. Cotton and oats have been considerably injured by the drought.

Milledgeville, Georgia: crops in this vicinity were suffering from drought until the 18th, when considerable rain fell.

Savannah, Georgia: on the 20th rain fell, which was much needed, none having fallen for three weeks. Crops were suffering from drought.

Hay Springs, Sheridan county, Nebraska: during the first twenty-eight days of the month only 0.37 inch of rain fell.

Charleston, Coles county, Illinois, 31st: ground dry and hard; rain much needed.

Saint Paul, Minnesota, 31st: vegetation in this vicinity is looking much stunted, and the country is beginning to suffer from drought.

The following is from the New York "Telegram" of June 3, 1886:

MINNEAPOLIS, Minnesota, June 1.—Crop prospects in the Northwest are not quite as favorable as a week ago. With the exception of the April rains, which came when seeding was about half completed, the weather has been dry, and complaints are becoming numerous that grain is suffering for want of moisture.

Fort Bridger, Wyoming Territory, 31st: the rainfall of the 29th and 30th, 0.20 inch, was the only appreciable precipitation